भारतीय मानक

Indian Standard

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रेन्फोर्सिंग के बिना अस्पताल रबड़ शीटिंग — विशिष्टि

(पहला पुनरीक्षण)

Hospital Rubber Sheeting Without Reinforcing Fabric — Specification

(First Revision)

ICS 83.140.10

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February 2023 **Price Group 5**

Rubber and Rubber Products Sectional Committee, PCD 13

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rubber and Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Rubber sheeting, both with and without reinforcing fabric are commonly used in hospitals. Rubber sheetings having cotton or synthetic fabric coated on both sides with rubber arc covered in IS 4135. The present standard covers only the rubber sheeting without any reinforcing fabric.

This standard contains clauses **3.1.2, 3.4**, **3.5** and **4.1** which call for agreement between the purchaser and the supplier

This standard was published in 1976. In this revision, the main changes are:

a) Cross referred standards have been updated;
b) Requirement of hardness, heavy metals, pah and nitrosamine have been incorporated; and
c) Amendment no 1, 2, 3 and 4 have been considered during the revision.

The composition of the committee responsible for the formulation of this standard is listed in Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 (*second revision*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

HOSPITAL RUBBER SHEETING WITHOUT REINFORCING FABRIC — SPECIFICATION

(First Revision)

1 SCOPE

This Indian Standard prescribes the requirements, and methods of sampling and test for plain rubber sheetings without any reinforcing fabric, for use in hospitals.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex A.

3 REQUIREMENTS

3.1 Materials

The sheeting shall be made from natural rubber or suitable synthetic rubber or combination thereof, compounded with necessary ingredientsso that the rubber sheeting conforms to all the requirements of the specification.

3.1.1 The rubber sheeting shall not contain any substances injurious to human body or having any deleterious effect on the rubber polymer.

3.1.2 The colour of the rubber sheeting shall be as agreed to between the purchaser and the supplier.

3.1.3 The thickness of the rubber sheeting shall be as agreed between the purchaser and the supplier with a deviation of ± 15 percent on the declared value.

3.2 Workmanship and Finish

The rubber sheeting shall be smooth, soft and pliable. It shall be free from pinholes, cuts, embedded foreign matter, surface irregularities, objectionable stains or odour. The workmanship shall be consistent with good manufacturing practice. The wheeling shall have a minimum thickness of 1 mm and shall be uniform in thickness

3.3 The rubber sheeting shall also conform to the requirements given in Table 1.

Table 1 Requirements for Hospital Rubber Sheeting Without Reinforcing Fabric

(*Clause* 3.3)

Sl No.	**Characteristic**	**Requirement**	**Method of Test, Ref To**	
			Annex	Indian Standard/Other Publication
(1)	(2)	(3)	(4)	(5)
i)	Mass, g/m^2	800 to 1000	—	IS 7016 (Part 1/Sec 1)
ii)	Tensile strength, MN/m^2 (approx. kgf / cm^2), *Min*	14 (140)	—	IS 3400 (Part 1), The thickness of the test specimen shall be same as single thickness of the product.
iii)	Elongation at break, percent, *Min*	350	—	-do-
iv)	Tension set at 250 percent elongation,15 min tension hold and 15 min recovery time, percent, *Max*	10	—	IS 3400 (Part 13), Using strip test pieces with enlarged ends and of thickness same as single thickness of the product.
v)	Hardness (Shore A)	50 ± 5		IS 3400 (Part 23/ Sec 1)

Table 1 (*Continued*)

Sl No.	**Characteristic**	**Requirement**	**Method of Test, Ref To**	
			Annex	Indian Standard/Other Publication
(1)	(2)	(3)	(4)	(5)
vi)	Accelerated ageing at 70 °C for 168 hours in all oven.		—	
	a) Change in tensile strength from original, percent, *Max*	+ 10 − 25	—	IS 3400 (Part 4)
	b) Change in elongation at break from original, percent *Max*	+ 0 − 25	—	
	c) Change in Hardness (Shore A)	+ 5 − 5		
vii)	Waterproofness under 300 mm head of water	There shall be no percolation or wet patches on the surface in contact with air	—	IS 7016 (Part 7)
viii)	Colour fastness to washing	Rating shall not be less than 5	—	IS/ISO 105-C10
ix)	Colour fastness to light1)	Rating shall not be less than 3	—	IS/ISO 105 : B01 IS/ISO 105 : B02
x)	Autoclaving test :		A	—
	a) Change in tensile strength from original, percent, *Max*	+ 10 − 25		
	b) Change in elongation at break from original, percent, *Max*	+ 10 − 15		
	c) Change in Hardness (Shore A)	+ 5 − 5		IS 3400 (Part 4)
xi)	Reaction of aqueous extract	The extract shall neither be acidic to methyl orange nor alkaline to phenolphthalein	B	—
xii)	Resistance to detergents and disinfectants	The test pieces shall not show any tackiness or other apparent deterioration	C	—
xiii)	Heavy metals, ppm, *Max*			
	a) Pb	20		ISO 19050
	b) Hg	10	-----	
	c) Cr	10		
	d) As	10		
	e) Cd	10		
xiv)	Polycyclic aromatic hydrocarbon a)Benzo(a) pyrene (BaP), ppm, Max	1		EN 16143

Table 1 (*Concluded*)

Sl No.	**Characteristic**	**Requirement**	**Method of Test, Ref To**	
			Annex	Indian Standard/Other Publication
(1)	(2)	(3)	(4)	(5)
	b) Sum of PAH[2], ppm, *Max*	10		
xv)	N-Nitrosamines, ppm, *Max*	1		Annex G of IS 3565

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[1] In case of dispute, IS/ISO 105 : B02 shall be the referee method.

[2] Individual PAHs are Benzo (a) anthracene; Chrysene, Benzo (b) fluoranthene, Benzo (j)) fluoranthene, Benzo (k) fluoranthene, Benzo (e) pyrene, Benzo (a) pyrene and Dibenzo (a,h) anthracene;)

3.4 Length and Width

The length of the rubber sheeting shall not be less than 20 m unless otherwise agreed to between the purchaser and the supplier. Similarly, unless otherwise agreed to, the width of the sheeting shall be 90 cm ± 1 cm. The length and the width shall be determined in accordance with the method given in IS 7016 (Part 1/Sec1).

3.5 Preservation

The sheeting shall be properly dusted with a suitable preservative to avoid stickiness. French chalk is a suitable preservative. Other treatment may be given if agreed to between the purchaser and the supplier.

4 PACKING AND MARKING

4.1 Packing

The rubber sheetings shall be packed as agreed to between the purchaser and the supplier.

4.2 Marking

Each piece of rubber sheeting shall be indelibly and clearly marked at one end with:

a) Manufacturer's name or trade-mark, if any;
b) Month and year of manufacture and batch number; and
c) Length, width and thickness.

4.2.1 *BIS Certification Marking*

Each piece of sheet conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

5 SAMPLING

5.1 For the purpose of ascertaining conformity of the sheeting in a consignment, the scale of sampling and criterion for conformity shall be as prescribed in Annex D.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No./Other Publication	*Title*
IS/ISO 105 : B01 : 2014	Textiles — Tests for colour fastness: Part B01 Colour fastness to light : daylight
IS/ISO 105 : B02 : 2014	Textiles — Tests for colour fastness: Part B02 Colour fastness to artificial light : xenon arc fading lamp test
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness: Part C10 Colour fastness to washing with soap or soda and soda
IS 285 : 1992	Laundry soaps — Specification (*third revision*)
IS 538 : 2020	Phenol (Carbolic Acid) — Specification (*third revision*)
IS 799 : 1985	Specification for ammonia, liquor (*second revision*)
IS 3400 (Part 1) : 2021/ISO 37 : 2017	Methods of test for vulcanized rubber: Part 1 Tensile stress-strain properties (*fourth revision*)
3400 (Part 4) : 2012/ISO 188 : 2011	Methods of test for vulcanized rubbers: Part 4 Accelerated ageing and heat resistance (*third revision*)
3400 (Part 13) : 2021/ISO 2285 : 2013	Tension set (*second revision*)
3400 (Part 23/ Sec1) : 2018/ISO 7619-1 : 2010	Determination of indentation hardness by means of pocket hardness meters, Section 1 Durometer method (shore hardness) (*first revision*)
IS 3565 : 2018	Teats for feeding bottles — Specification (*First Revision*)
IS 4905 : 2015/ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
IS 7016 (Part 1/Sec 1) : 2016/ISO 2286-1 : 1998	Methods of test for coated and treated fabrics: Part 1 Determination of roll characteristics, Section 1 Methods for determination of length, width and net mass (*second revision*)
IS 7016 (Part 7) : 2009/ISO 1420 : 2001	Methods of test for coated and treated fabrics: Part 7 Rubber-or plastics-coated fabrics — Determination of resistance to penetration by water (*second revision*)
ISO 19050 : 2015	Rubber, raw, vulcanised — Determination of metal content by ICP-OES
EN 16143	Petroleum products — Determination of content of Benzo(a) pyrene (BaP) and selected polycyclic aromatic hydrocarbons (PAH) in extender oils —Procedure using double LC cleaning and GC/MS analysis

ANNEX B

[*Table* 1, *Sl No.* (x)]

AUTO CLAVING TEST

A-1 PROCEDURE

A-1.1 Subject dumbbell test pieces cut from the sample to steam pressure of 0.1 MN/m^2 (approx 1 kgf/cm^2) for 20 min in an autoclave after removal of air. Take out the test pieces from the autoclave and expose them to air at room temperature for 2 h. Repeat the auto claving process after which blot out the adhering water from the test pieces and condition them for 24 h in air at 27 °C ± 2 °C and 65 percent ± 5 percent relative humidity. The test pieces are then subjected to tensile and elongation at break test according to IS 3400 (Part 1).

ANNEX C

[*Table* 1, *Sl No.* (xi)]

REACTION OF AQUEOUS EXTRACT

B-1 PROCEDURE

B-1.1 Weigh 10 g of the sample, cut into small pieces approximately 3 mm^2 in area, into a chemically resistant glass flask and add 300 ml of water. Fit the flask with a water-cooled reflux condenser with ground-glass connection and heat the water to boiling point. Continue boiling for half an hour. Detach the flask from the condenser, cover immediately to prevent any possible contamination and cool the contents to room temperature. Check the reaction of aqueous extract to methyl orange and phenolphthalein.

ANNEX D

[*Table* 1, *Sl No.* (xii)]

RESISTANCE TO DETERGENTS AND DISINFECTANTS

C-1 REAGENTS

C-1.1 Phenol — Saturated aqueous solution of phenol (see IS 538)

C-1.2 Anmonia Solution — Relative density 0.9 (see IS 799).

C-1.3 Soap Solution — Five percent aqueous solution of soap (m/v) conforming to Type 1 of IS 285.

C-2 PROCEDURE

C-2.1 Take three samples of the finished sheeting. Immerse one in each of the specified reagents for the length of time and temperature stated below. After immersion, examine the pieces visually.

Sl No. (1)	*Immersion Medium* (2)	*Time, Min* (3)	*Temperature* (4)
i)	Phenol solution	15	27 °C ± 2 °C
ii)	Ammonia solution	30	27 °C ± 2 °C
iii)	Soap solution	10	Boiling temperature

ANNEX D

(*Clause* 5.1)

SAMPLING OF HOSPITAL RUBBER SHEETING WITHOUT REINFORCING FABRIC

D-1 SCALE OF SAMPLING

D-1.1 Lot

All the hospital rubber sheetings in a single consignment belonging to a single batch of manufacture shall be grouped together to constitute a lot.

D-1.2 Samples shall be tested separately for each lot for ascertaining the conformity of the lot to the requirements of this specification. The number of samples to be selected for this purpose shall be in accordance with Table 2.

D-1.3 The selection of rolls from a lot shall be done at random. To ensure the randomness of selection, random number tables (*see* IS 4905) shall be used. In case random number tables are not available the following procedure may be adopted :

Starting from any roll in the lot, count them in one order as 1, 2, 3, ..., etc, up to r and so on, where r is the integral part of N/n, N being the number of rolls in the lot and n the number of rolls to be selected. Every rth roll shall be taken to constitute the sample.

D-2 NUMBER OF TESTS AND CRITERION FOR CONFORMITY

D-2.1 Every one of the rolls selected in **D-1.2** shall be examined for all the requirements of this specification individually. For this purpose, from each roll a full width piece of 450 mm in length shall be cut leaving at least half a metre from the end. The test pieces for all the tests shall be taken from this piece.

D-2.2 The lot shall be considered to satisfy the requirements of this specification if none of the rolls selected and tested fails in any of the requirements of this specification.

Table 2 Scale of Sampling

(*Clause* D-1.2)

Sl No. (1)	Number of Rolls in a Lot (2)	Number of Rolls to be Selected (3)
i)	2 to 8	2
ii)	9 to 25	3
iii)	26 to 100	5
iv)	101 to 300	8
v)	301 to 1 000	13
vi)	1 001 and above	20

ANNEX F

(*Foreword*)

COMMITTEE COMPOSITION

Rubber and Rubber Products Sectional Committee, PCD 13

Organization	*Representative(s)*
Rubber Research Institute of India, Rubber Board, Kottayam	Dr Siby Varghese (***Chairperson***)
All India Rubber Industries Association, Mumbai	Shri Srikanth Krishnamurthy Shri Chinmoy Ray (*Alternate*)
Association of Latex Producers of India, Kerala	Shri Satish Abraham
Association of Planters of Kerala, Thiruvananthapuram	Shri Santosh Kumar Shri Philip C. Jacob (*Alternate*)
Automotive Tyres Manufacturers Association (ATMA), New Delhi	Shri Rajiv Budhraja Shri Niteesh K. Shukla (*Alternate*)
Block Rubber Processors Association of India, Mumbai	Shri Rajiv Tharian Shri Ronny Joseph (*Alternate*)
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Organization	*Representative(s)*
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Reliance Industries Ltd. (Elastomers Business), Vadodara	DR ABHIJIT ADHIKARY SHRI SHAMBHU LAL AGARWAL (*Alternate*)
Research, Designs & Standards Organization (RDSO), Lucknow	SHRI MNJESH KUMAR
Shri Sati Rubber Industries, Jaipur	SHRI VIJAY KUMAR AGARWAL SHRI SUDHIR AGARWAL (*Alternate*)
Hindustan Latex Lifecare Limited,	DR A. G. SHANKARAN
Voluntary Organization in Interest of Consumer Education (VOICE), New Delhi	SHRI M. A. U. KHAN SHRI H. WADHWA (*Alternate*)
In Personal Capacity (*A-302-303, Casa Central, Sarabhai Compound, Genda Circle, Vadiwadi Vadodara – 390007, Gujarat*)	DR ARUP K. CHANDRA
In Personal Capacity (*Kerala*)	DR SUNNY SEBASTIAN
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